

STUDIES ON THE MEDUSAE (CNIDARIA) FROM THE BEIBU GULF IN THE NORTHERN SOUTH CHINA SEA, WITH DESCRIPTION OF THREE NEW SPECIES

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Abstract Medusae from the Beibu Gulf, in the Northern South China Sea, are described from 364 samples collected during seven seasonal oceanographic censuses from Jan., Apr., July and Oct. 2007, Jan. and July 2008, and Jan. 2009. A total of 67 species were identified, three of which are new to science: *Tregubovia perradialis* sp. nov., *Euphydora vacuola* sp. nov., and *Helicirha sinuatus* sp. nov. Two species are new records for Chinese waters, i. e. *Timoidea agassizi* Bigelow, 1904 and *Clyta macrogonia* Bouillon, 1984, while 20 species are new records for the Beibu Gulf. The types are deposited in the South China Sea Fisheries Research Institute, Chinese Academy of Fishery Science.

Key words Cnidaria, Hydroidomedusae, new species, Beibu Gulf.

1 Introduction

The Beibu Gulf is located in the Northwestern part of the South China Sea (17° – $21^{\circ}45'N$, $105^{\circ}40'$ – $110^{\circ}10'E$). It covers 129 300 km², with an average depth of 38 m and a maximum depth of 110 m in the gulf mouth. The Beibu Gulf is a semi-enclosed gulf, bordered on the east by the Leizhou Peninsula, the North by Guangxi Province, and the West by Vietnam. It connects with the South China Sea at the mouth of the gulf. It is located in the subtropical latitudes with a yearly sea surface temperature ranging between $12.6^{\circ}C$ – $30.3^{\circ}C$ and a salinity ranging between 27–33. Because of its location in the monsoonal zone of the Southeastern Asia, it provides a variety of habitats with complex environmental conditions. Species diversity is high in the Beibu Gulf, and it is also one of the major productive fishing grounds in China.

Previous taxonomic studies of the medusa in the Beibu Gulf were conducted by Huang (1987) along the Southern Coast of Guangxi during six seasonal oceanographic cruises in Aug., Oct. to Nov. 1983, Mar., Apr. and July 1984, and Jan. 1985. A total of 64 species were identified (Huang, 1987). This study was limited to the Northern portion of the Beibu Gulf. A more current study in the Beibu Gulf in 2006–2007 made further advances in both the taxonomy and ecology of planktonic medusa. This comprehensive investigation found a total of 99 species belonging to

the Narcomedusae (7 species), Trachymedusae (8 species), Anthomedusae (42 species), Leptomedusae (40 species), and Scyphozoa (2 species) (Guo *et al.*, 2008a), and included six species new to science and three newly recorded species for China (Xu *et al.*, 2008). Guo *et al.* (2008b) also conducted work on the general ecology of neritic and oceanic groups, including species composition, temporal and spatial distributions, and other ecological characteristics.

In several current surveys of the Beibu Gulf, eleven new species, one new record and one new combination of Anthomedusa and Leptomedusa were recorded (Xu *et al.*, 2009a, b; Du *et al.*, 2010; Huang *et al.*, 2010a; Li *et al.*, 2010; Lin *et al.*, 2010).

2 Materials and Methods

We analyzed the planktonic medusa composition in 364 samples collected from stations ($17^{\circ}30'$ – $21^{\circ}30'N$, $106^{\circ}30'$ – $109^{\circ}30'E$) in the Beibu Gulf during seven seasonal oceanographic cruises. The cruises took place during all four seasons in 2007, Winter (Jan.) and Summer (July) in 2008, and Winter (Jan.) in 2009 (Fig. 1). All planktonic samples were collected using a plankton net (80 cm diameter, 0.505 mm mesh size) by vertical towing from the bottom to the surface. Samples were preserved with 5% buffered formalin in seawater. Samples were examined using stereoscopic and light microscopy, and taxonomic identifications were

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This study was supported by the National Basic Research Program of China (973 Project, 2011CB403604), the Chinese Ministry of Agriculture under the Investigation of Fishery Stocks in China Seas Program, and the State Oceanic Administration of China under the Integrated Survey and Assessment of Coastal China Seas.

Received 1 Dec. 2011, accepted 14 May 2012.

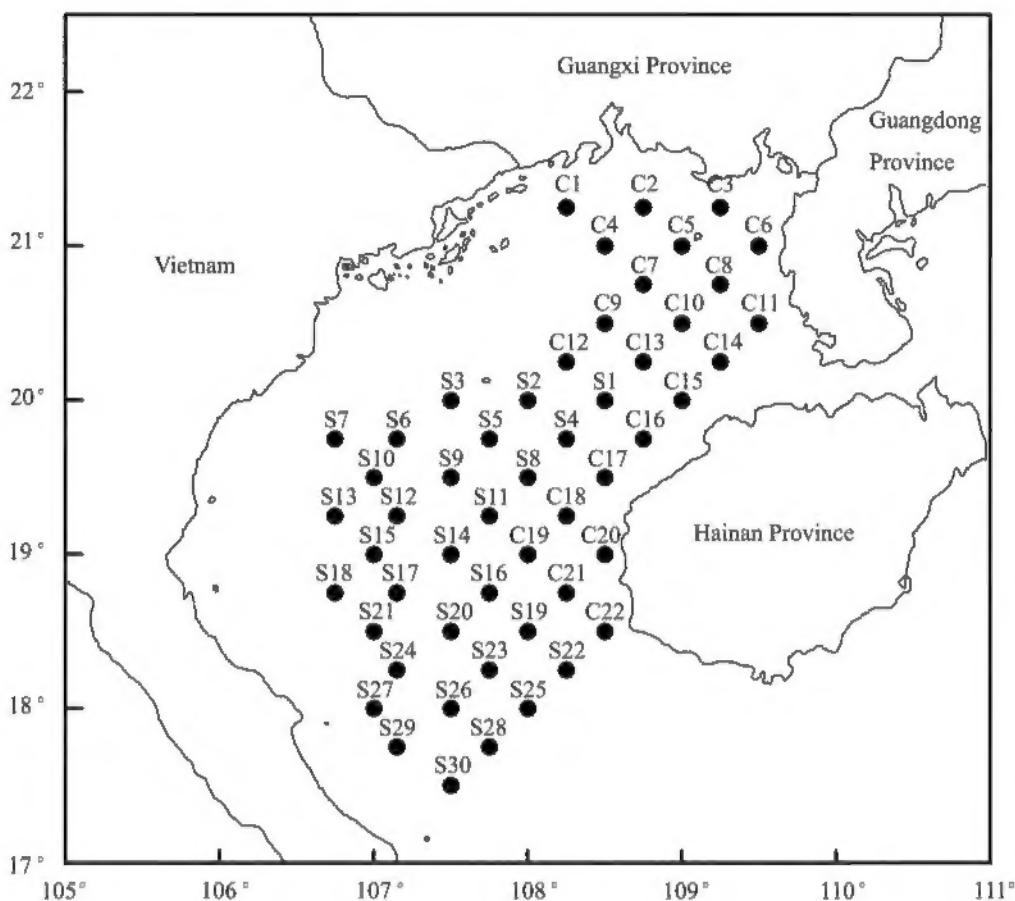


Fig. 1. Map of the study area showing the locations of sampling stations in the Beibu Gulf.

undertaken using descriptions in the literature, as specified in the reference section.

Specimens were examined with a Zeiss dissecting microscope or an Olympus BH2 microscope. All drawings were made from preserved specimens using an attached *camera lucida*. Microphotographs were taken using either an Axiocam MRC5 (Zeiss) dissecting microscope or a Micaren DC200 camera mounted on an Olympus microscope. Type specimens are archived in the South China Sea Fisheries Research Institute.

Abbreviations are listed as follows: specimen (s), spm (s); Beibu Gulf, BG; South China Sea Fisheries Research Institute, SFR; Xiamen University, XMU; station, st; collector, coll.

3 TAXONOMIC ACCOUNT

A total of 67 medusae species were identified, three of which are new to science. Two species are reported from Chinese waters for the first time, and another 20 species are reported from the Beibu Gulf for the first time. Based on previous reports (Huang, 1987; Xu *et al.*, 2009a, b; Guo *et al.*, 2008a, b; Du *et al.*, 2010; Huang *et al.*, 2010a; Li *et al.*, 2010; Lin *et al.*, 2010) and recent records of authors, there are 154 species of medusae in the Beibu Gulf (Table 1). The purpose of this study is to describe the three new

species of medusae and the two newly reported species from Chinese waters.

Subclass Anthomedusae Haeckel, 1879

Order Filifera Kühn, 1913

Family Ptilocodiidae Coward, 1909

Tregoubovia Picard, 1958

Tregoubovia perradialis Xu, Huang *et al.*, sp. nov.
(Figs 2–4, 13)

Holotype, Beibu Gulf, BG 001 (1 spm.), st. S30 (17° 30' N, 107° 30' E; depth. 70 m), 6 July 2008, coll. LIANG Xin (SFR).

Etymology. From the Latin *perradialis*, meaning per-radial. The species name refers to the gonads in the perradial position of the manubrium.

Description. Umbrella 6 mm high, 5 mm wide, nearly dome-shaped, with vertical wall and flattened, rounded apex, jelly uniformly thick, apical jelly slightly thickened; up to 16 exumbrellar didermic centripetal tracks issuing from marginal ring; manubrium very large, quadratic, about 4/5 as long as bell cavity, with 4 inter-radial sub-umbrella projections beneath the umbrellar apex; mouth quadratic with 4 elongated perradial oral lips, tentacle-like, without one terminal cluster of cnidocysts and with ring cnidocysts along the whole length of the oral

Table 1. List of medusae in the Beibu Gulf.

续表 1 (Continue Table 1)

Species	Jan. 2007	Apr. 2007	July 2007	Oct. 2007	Jan. 2008	July 2008	Jan. 2009	Records
<i>J. brevispura</i> Xu, Huang et Guo, 2009	-	-	-	-	-	-	-	R
<i>Leuchartiara octona</i> (Fleming, 1823) *	+	-	-	-	+	-	-	
<i>Merga minutum</i> Xu, Huang et Chen, 1991	-	-	-	-	-	-	-	R
<i>M. tergestina</i> (Nepipi et Stiasny, 1912)	-	-	-	-	-	-	-	R
<i>Pandeopsis iku</i> (Uchida, 1927) *	-	-	+	-	-	-	-	R
<i>Timoides agassizi</i> Bigelow, 1904 *	-	-	-	+	-	-	-	
Family Proboscidactylidae Hand & Hendrickson, 1950								
<i>Proboscidactyla ornata</i> (McCrady, 1859)	+	+	+	+	-	+	-	R
Family Protiaridae Haeckel, 1879								
<i>Halitiara formosa</i> Fewkes, 1882 *	+	+	+	+	+	+	-	
Family Halimedusidae Arai & Brinckmann-Voss, 1980								
<i>Tiaricodon coeruleus</i> Browne, 1902	-	-	-	-	-	-	-	R
Family Hydrocorynidae Rees, 1957								
<i>Hydrocoryne miurensis</i> Stechow, 1907 *	-	-	-	-	-	+	-	
Family Corymorphidae Allman, 1872								
<i>Euphysona vacuola</i> sp. nov. ***	-	-	+	-	-	-	-	
<i>E. annulata</i> Kramp, 1928	-	-	-	-	-	-	-	R
<i>E. bigelowi</i> Maas, 1905	+	+	-	+	+	-	+	R
<i>E. brunneostriata</i> Huang, 1999	-	-	-	-	-	-	-	R
<i>E. furcata</i> Kramp, 1948 *	-	-	-	-	-	-	+	
<i>E. interrogata</i> Xu et Huang, 2003 *	+	-	-	-	-	-	+	
<i>E. verrucosa</i> Bouillon, 1978	+	+	+	+	+	+	+	R
<i>Vannuccia forbesi</i> (Mayer, 1894)	-	+	+	+	+	+	+	R
Family Corynidae Johnston, 1836								
<i>Cladosarsia gulangensis</i> Xu et Huang, 2006	-	-	-	-	-	-	-	R
Family Euphysonidae Haeckel, 1879								
<i>Cnidocodon xiamensis</i> (Zhang et Wu, 1981)	-	-	-	-	-	-	-	R
<i>Euphysonoma brevia</i> Uchida, 1947	-	-	-	-	+	-	-	R
Family Tubulariidae Fleming, 1828								
<i>Ectopleura apicisacciformis</i> Xu, Huang et Guo, 2007 *	+	-	-	-	+	-	+	
<i>E. minervae</i> Mayer, 1900	-	+	+	-	-	-	-	
<i>E. xiamensis</i> Zhang et Lin, 1984 *	-	-	+	+	-	-	-	
Family Porpitidae Goldfuss, 1818								
<i>Porpita porpita</i> (Linnaeus, 1758)	-	-	+	+	-	-	-	R
Family Teissieridae Bouillon, 1974								
<i>Teissiera australis</i> Bouillon, 1978	-	-	-	-	-	-	-	R
<i>T. medusifera</i> Bouillon, 1978	-	-	-	-	-	-	-	R
Family Zancleidae Russell, 1953								
<i>Zanclea apicata</i> Xu, Huang et Guo, 2008	-	-	-	-	-	-	-	R
<i>Z. apophysis</i> Xu, Huang et Guo, 2008	-	-	-	-	-	-	-	R
<i>Z. costata</i> Gegenbaur, 1857	-	+	+	+	+	+	-	R
<i>Z. macroystae</i> (Xu, Huang et Chen, 1991)	-	-	-	-	-	-	-	R
<i>Z. protecta</i> Hastings, 1930	-	-	-	-	-	-	-	R
Subclass Leptomedusae Haeckel, 1866 (1879)								
Family Aequoreidae Eschscholtz, 1829								
<i>Aequorea conica</i> Browne, 1905	-	-	-	-	-	-	-	R
<i>A. globosa</i> Eschscholtz, 1829 *	+	-	-	-	-	-	-	
<i>A. papillata</i> Huang et Xu, 1994 *	+	-	-	-	-	-	-	
<i>A. parva</i> Browne, 1905	+	-	-	-	+	-	+	R

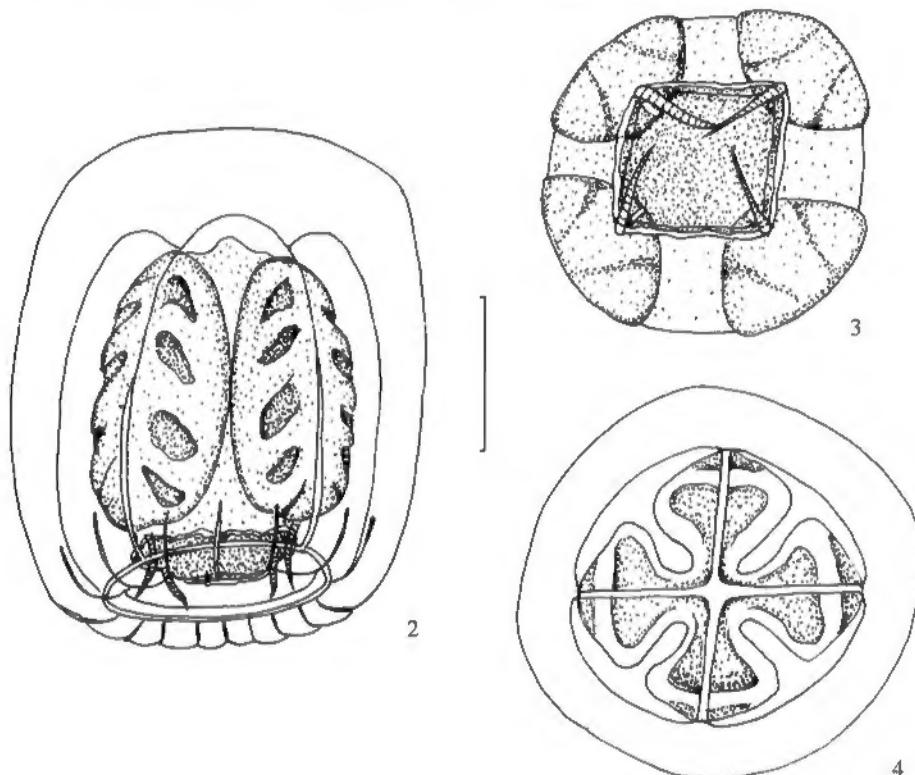
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Species	Jan. 2007	Apr. 2007	July 2007	Oct. 2007	Jan. 2008	July 2008	Jan. 2009	Records
Class Scyphozoa Götte, 1887								
Family Nausithoidae Bigelow, 1913								
<i>Nausithoe punctata</i> Kolliker, 1853	-	-	-	-	-	-	-	R
Family Pelagiidae Gegenbaur, 1856								
<i>Pelagia noctiluca</i> (Forskål, 1775)	-	-	-	-	-	-	-	R

* New records for the Beibu Gulf. ** New records for Chinese waters. *** New species. - None found. + Abundance ($>0 - 5$ ind/ m^3). ++ Abundance ($>5 - 10$ ind/ m^3). + + + Abundance ($>10 - 50$ ind/ m^3). R. Recorded by Huang 1987, Guo *et al.* (2008a); Xu *et al.* (2008); Xu *et al.* (2009a-b); Du *et al.* (2010); Huang *et al.* (2010); Li *et al.* (2010) and Lin *et al.* (2010).



Figs 2-4. *Tregoubovia perradialis*. 2. Lateral view. 3. Oral view of mouth and gonads. 4. Apical view. Scale bar = 2 mm.

lips; 4 radial canals and one narrow circular canal, about half the length of manubrium connected to the radial canals by mesenteries; 4 gonads very large, long and elliptical, almost covering perradial part along the whole length of manubrium, each gonad with 2 adradial series of 4-5 isolated pits; without marginal tentacles or marginal bulbs; no ocelli; velum normal.

Remarks. A new species with an exumbrellar didermic centripetal track; without exumbrellar furrows; without marginal tentacles or marginal bulbs.

Only one species of *Tregoubovia* is known (Picard, 1958; Bouillon & Boero, 2000; Bouillon *et al.*, 2006). This new species differs from *T. atentaculata* Picard, 1958 as follows.

T. atentaculata. Umbrella 3.2 mm high, ovoid, jelly fairly thick; with up to 16 exumbrellar didermic centripetal tracks issuing from marginal cnidocyst ring;

mouth with four long perradial oral expansions, with one terminal cluster of cnidocysts; gonad interradial of manubrium.

T. perradialis. Umbrella 6 mm high, dome-shaped, jelly uniformly thick, with up to 16 exumbrellar didermic centripetal tracks, issuing from marginal ring, mouth with four perradial oral lips elongated to form tentacle-like projections, without terminal knob and with ring cnidocysts along oral lips, gonad in perradial position of manubrium, long and elliptical, almost covering whole length of manubrium.

The gonads in the family Ptilocodiidae were considered to be adradially or interradially positioned on the manubrium walls (Bouillon & Boero, 2000). The gonads of *Tregoubovia perradialis* are perradial and the definitions of both the family Ptilocodiidae and the genus *Tregoubovia* are, in consequence, slightly

modified as follows.

Family Ptilocodiidae. Anthomedusae with simple gonads situated adradially or interradially on manubrium walls, or completely perradial gonads.

Genus *Tregoubovia*. Ptilocodiidae with gonads in interradial or perradial positions on manubrium walls.

Distribution. Northern Southern China Sea (Beibu Gulf).

Family Pandeidae Haeckel, 1879

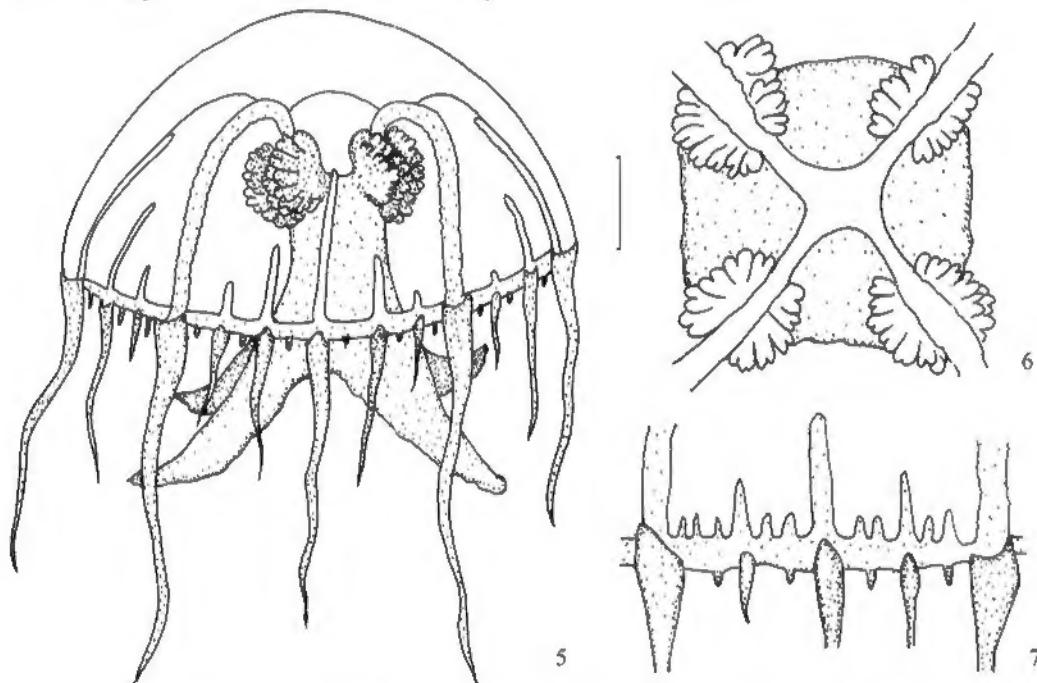
Timoides agassizi Bigelow, 1904 (Figs 5–7, 14)

Timoides agassizi Mayer, 1910: 212–213, Fig. 108; Kramp, 1968: 65, Fig. 169; Bouillon *et al.*, 2006: 197.

Material examined. Beibu Gulf, BG 002–005 (4 spms.), st. S19 ($18^{\circ}30'N$, $108^{\circ}E$; depth. 70 m), Oct. 2007, coll. LIANG Xin (SFR).

Description. Umbrella 4–8 mm high, 6–11 mm wide; nearly spherical with round dome, apex very thick; gastric peduncle, short and broad, flaring at its base about 1/3 as long as bell diameter, reducing

gradually toward stomach; manubrium long and broad, barrel-shaped, bears 4 lance-shaped lips with complexly folded margins, about the same length as the combined length of stomach and peduncle, almost all lips extend beyond the bell opening; 4 large, complexly folded gonads on the lower part of peduncle, above the 4 broad radial canals bending towards the base of manubrium, each gonad consists of many simple and branched papilliform processes on both sides of the 4 radial canals, forming 4 prominent, double ridges; 4 radial canals and 5 centripetal canals of different lengths arising from the ring canal in each quadrant, of which one interradial centripetal canal is longer than the length of the 2 adradial ones; 24 tentacles, 4 radial, 4 interradial, 8 adradial and 8 intermediate, one club-shaped tentacle between the tentacles, but no lateral cirris; the base of the tentacles with black pigment patches; velum broad.



Figs 5–7. *Timoides agassizi* Bigelow, 1904. 5. Lateral view. 6. Apical view of gonads. 7. Partial enlargement of the umbrella margin. Scale bar = 2 mm.

Remarks. The specimens from the Northern South China Sea correspond to the description by Mayer (1910) and Kramp (1968), but are smaller. The collected samples also vary in number of tentacles and centripetal canals. This is possibly a related species at a different stage of development. This species has not been previously recorded from Chinese waters.

Distribution. Northern South China Sea, Maldives Island in the Indian Ocean (Kramp, 1968; Mayer, 1910).

Order Capitata Kühn, 1913
Family Corymorphidae Allman, 1872

Euphyysora vacuola Xu, Huang *et* Guo, sp. nov. (Figs 8, 15)

Holotype, Beibu Gulf, BG 006 (1 spm.), st. C15 ($20^{\circ}N$, $109^{\circ}E$; depth. 44 m), 25 July 2007, coll. LIANG Xin (SFR). Paratype, Taiwan Bank, TB 001 (1 spm.), st. 102 ($23^{\circ}40'N$, $118^{\circ}44'E$; depth. 54 m), 29 June 1988, coll. HUANG Jia-Qi (XMU).

Etymology. From the Latin *vacuola*, meaning vacuole. The species name refers to the covering compact vacuolated endodermal cells above apical of manubrium.

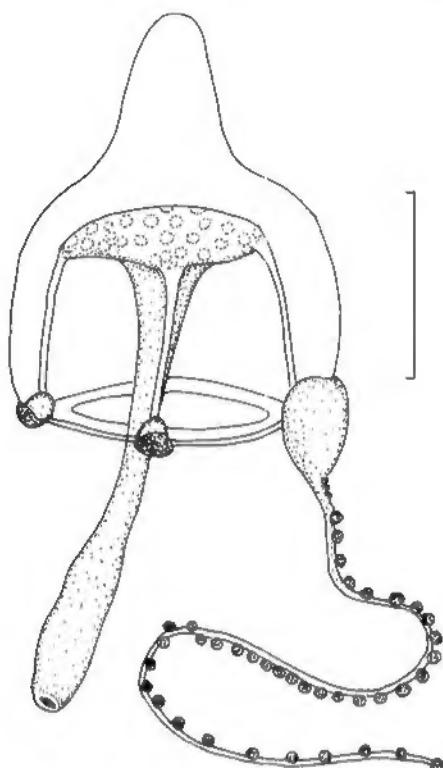


Fig. 8. *Euphysora vacuola*. Scale bar = 0.5 mm.

Description. Umbrella 0.8 – 1.2 mm high (including apical projection), 0.6 – 0.7 mm wide, bell-shaped, with a well developed rounded solid apical projection, jelly uniformly thick excluding top, exumbrella smooth; manubrium thick, long and cylindrical, with broad, pyramidal base, about 1/2 the length of the manubrium extending beyond the velar opening; 4 radial canals that continue through compact vacuolated endodermal cells situated above apical part of manubrium; mouth simple, circular; gonad completely surrounding manubrium; principal tentacle very long, tentacular bulb very large, nearly ovaliform to spherical, with 30 – 40 abaxial cnidocyst knobs and without large terminal knob, the 3 other perradial bulbs very small, rudimentary, without pointed tentacles, each with an ectodermal abaxial spur armed with cnidocysts; velum moderately wide.

Remarks. The new species has 3 rudimentary tentacles and 1 long principal tentacle that differ from others not only in size, but also in structure. These features place this medusa in the family *Corymorphidae* Allman, 1872, the genus *Euphysora* Maas, 1905 (Bouillon *et al.*, 2006).

Only 20 valid species of *Euphysora* are known (Huang, 1999; Bouillon & Boero, 2000; Xu & Huang, 2003, 2006; Bouillon *et al.*, 2006). This new species can be distinguished from the other species of *Euphysora* by 4 major characteristics. The manubrium is thick and long, with about half the length of the manubrium extending beyond the velar opening. It

has a very broad base, covering compact vacuolated endodermal cells. The principal tentacle is thin and long, with 30 – 40 abaxial cnidocysts knobs and no large terminal knob and there are 3 very small rudimentary perradial bulbs, with an ectodermal abaxial spur (Key to species).

The genus *Euphysora* erection by Maas in 1905, this medusa genus has had a complex taxonomic history. At various times, it has had been combined with either *Euphysa* Forbe, 1848, *Corymorpha* M. Sars, 1835 (as *Steenstrupia* Forbe, 1846) or both. Hartlaub (1907) immediately reassigned the type species, *Euphysora bigelowi* Maas, 1905 to the genus *Corymorpha* within the subgenus *Euphysa*; and Mayer (1910) combined *Euphysora* and *Euphysa* into *Steenstrupia*. Vanhoffen (1911) and Brown (1916) thereupon retained *Euphysora*; but little more than a decade later, Uchida (1927) assigned *Euphysora bigelowi* to *Euphysa*. The following year, Kramp (1928, 1961, 1968) argued for the retention of *Euphysora*, further suggesting that genus *Euphysora* was more closely allied to *Corymorpha* than to *Euphysa*. Up to 1978, the life cycle of the type species, *Euphysora bigelowi* is described by Sassaman and Rees (1978). They are deemed appropriate to refer to both the polyp and the *Euphysora bigelowi* medusa as *Corymorpha bigelowi*. Petersen (1990) considered the genus *Euphysora* Maas, 1905 belongs to synonym of genus *Corymorpha* M. Sars, 1835. Schuchert (1996) suggested that the *Corymorpha* is now mainly defined through its polyp phase which offers better characters, but some of the characters of medusa given in Petersen's diagnosis may be problematic. The flared mouth rim, for example, could not be seen in available preserved material and could not be verified from other sources. Bouillon *et al.* (2006) as yet retained *Euphysora*, because of the hydranth of the *Euphysora bigelowi* with numerous oral capitate tentacles in irregular whorls; aboral tentacles filiform; medusae with 3 short or rudimentary marginal tentacles and one long principal tentacle with a single row of adaxial cnidocysts knobs that differs from others not only in size, but also in structure. These features differ from the genus *Corymorpha*. We agree with Bouillon and Boero (2000) and Bouillon *et al.* (2006) on that the genus *Euphysora* is here considered as valid, while ultimate resolution of the systematic position of genus *Euphysora* will require additional life cycle data of various species.

Distribution. Northern South China Sea (Beibu Gulf and Taiwan Bank).

Key to *Euphysora*.

1. Umbrella margin with medusa buds	<i>E. gemmifera</i> Bouillon, 1978
Umbrella margin without medusa buds	2
2. Exumbrella with wart processes or nematocysts, with or without apical	

projection; three identical rudimentary bulbs, with or without pigment *E. verrucosa* Bouillon, 1978 (syn. *E. knides* Huang, 1999)
 Exumbrella without wart processes or nematocysts 3

3. With only one tentacle, very long and thin, with several bifurcated lateral branches, bell globular *E. gigantea* Kramp, 1957
 With one long and small or rudimentary tentacle 4

4. Terminal end of principal tentacle twice bifurcated 5
 Principal tentacle unbranched 6

5. Principal tentacle long, the four terminal branches each with a knob of nematocysts; opposite a fairly long filiform tentacle
 *E. furcata* Kramp, 1948
 Principal tentacle short, without knobs of nematocysts, the three other tentacles cone-shaped *E. vaidiviae* Vanhöffen, 1911

6. Principal tentacle moniliform 7
 Principal tentacle with a single row of nematocyst knobs 12

7. Moniliform tentacle with number of prominent swelling knobs at intervals *E. garcilis* (Brooks, 1882)
 Moniliform tentacle without prominent swelling knobs 8

8. Moniliform tentacle has proximal part with 4–5 ring cnidocysts and other whole tentacles have over 16 spherical cnidocyst knobs
 *E. fujianensis* Xu *et* Huang, 2006
 Moniliform tentacle has only ring cnidocysts, or only one row of spherical cnidocyst knobs 9

9. Moniliform tentacle has only ring cnidocysts 10
 Moniliform tentacle only one row of spherical cnidocyst knobs
 11

10. Umbrella without apical projection; principal tentacle with a large spherical terminal knob of nematocysts; opposite a rudimentary tentacular bulb, other two lateral tentacles cone-shaped; all tentacle bulbs extending to both lateral sides
 *E. solidonema* Huang, 1999
 Umbrella with apical projection and apical canal; principal tentacle without terminal knob, the three other perradial bulbs short and cone-shaped, each with a short filiform tentacle
 *E. annulata* Kramp, 1928

11. Moniliform principal tentacle with nine spherical nematocyst knobs, opposite this a rudimentary, bulb-shaped tentacle, other two lateral tentacles long, filiform; mouth as wide as the manubrium
 *E. russelli* Hammond, 1974
 Moniliform principal tentacle with over 16 nearly elliptical nematocyst knobs, other bulbs of three rudimentary tentacles, all alike, without filiform tentacles; mouth about half as wide as the manubrium *E. taiwanensis* Xu *et* Huang, 2003

12. The row of nematocyst knobs on principal tentacle abaxial 13
 The row of nematocyst knobs on principal tentacle adaxial or lateral
 18

13. Manubrium thick and long, extends about half a length beyond velar opening; manubrium with very broad base, covering compact vacuolated endodermal cells; principal tentacle thin and long, with 30–40 abaxial cnidocyst knobs and without terminal knob, other three rudimentary perradial bulbs very small with abaxial spur ...
 *E. vacuola* Xu, Huang *et* Guo, sp. nov.
 Manubrium shorter than bell cavity, manubrium base without vacuolated cells 14

14. Principal tentacle with both semicyclic nematocyst knobs and normal nematocyst knobs 15
 Principal tentacle without semicyclic nematocyst knobs, only normal nematocyst knobs 16

15. Umbrella with apical projection and apical chamber or without apical projection but with apical chamber; manubrium very large, filling the bell cavity, the base of principal tentacle swollen on the inner side, nearly spherical; three other marginal bulbs, the one opposite the main tentacle larger than the two others
 *E. apiciloculifera* Xu *et* Huang, 2003
 Umbrella without apical projection or apical chamber; principal tentacle short, with six abaxial hemicyclic cnidocyst clusters and with a large spherical terminal knob of nematocyst; main tentacle bulb large, nearly elliptical, three rudimentary tentacle bulbs small, all alike *E. abaxialis* Kramp, 1962

16. Gonads on interradial side of manubrium, principal tentacle very long, with over 60 knobs of nematocysts in one row along the abaxial side, three other marginal bulbs rudimentary, very small, all alike *E. intergona* Xu *et* Huang, 2003
 Gonads surrounding manubrium wall 17

17. Principal tentacle long, with 50–60 abaxial nematocyst knobs, three rudimentary tentacular bulbs with six to eight brown pigment spots on their abaxial clusters *E. brunneocentris* Huang, 1999
 Principal tentacle short, with 12 abaxial nematocyst knobs, the bulb of principal tentacle small, spherical, as long as other rudimentary bulbs, all other three rudimentary bulbs without brown pigment spots *E. pseudoabaxialis* Bouillon, 1978

18. Four radial canals thick and broad, with vacuolated endodermal cells in radial canals *E. crassocanalis* Xu *et* Huang, 2003
 Four radial canals narrow, without vacuolated endodermal cells
 19

19. Umbrella without apical projection, principal tentacle with a large oval bulb and 3–6 very small, spherical, adaxial nematocyst knobs, and a very large, nearly oval terminal knob of nematocysts, opposite a very small, nearly papilla sized bulb, two lateral tentacles with longer, cone-shaped bulbs, with filiform tentacles
 *E. macrobulbus* Xu *et* Huang, 2003
 Umbrella with apical projection, other three rudimentary tentacular bulbs all alike 20

20. Exumbrella with nematocyst tracks, principal tentacle short, with a large, sac-like bulb and three lateral knobs of nematocysts, three other marginal bulbs rudimentary, very small
 *E. normani* (Browne, 1916)
 Exumbrella without nematocyst tracks, principal tentacle long, with a small spherical bulb and over ten adaxial knobs of nematocysts, three other perradial bulbs each with a short, pointed tentacle without nematocyst clusters *E. bigelowi* Maas, 1905

Subclass Leptomedusae Haeckel, 1866

Order Conida Broch, 1910

Family Eirenidae Haeckel, 1879

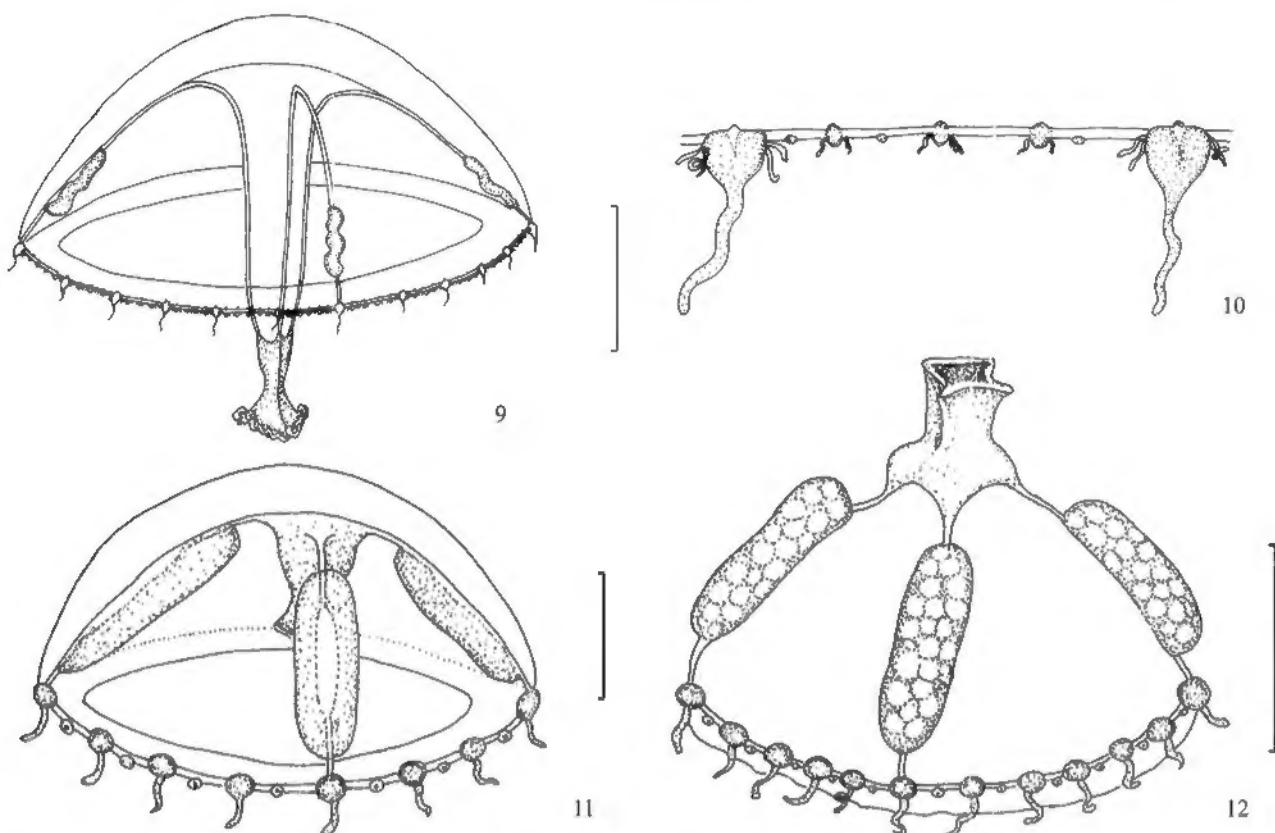
Helgicirrha sinuatus Xu, Huang *et* Du, sp. nov.

(Figs 9–10, 16–17)

Holotype, Beibu Gulf, BG 007 (1 spm.), st. S18 (18°45'N, 106°45'E; depth. 53 m), 15 Apr. 2007, coll. LIANG Xin (SFR). Paratype, Beibu Gulf, BG 008–009 (2 spms.), st. S18 (18°45'N, 106°45'E; depth. 53 m), 15 Apr. 2007, coll. LIANG Xin (SFR).

Etymology. From the Latin *sinuatus*, meaning sinuate. The species name refers to the sinuous shape of the gonads.

Description. Umbrella 7–11 mm high, 12–22 wide, somewhat flatter than a hemisphere, apex round, jelly thick, thinning down toward the umbrella margin; gastric peduncle very long, pyramidal base, about 1/3 the length of the peduncle extending beyond the velar opening; manubrium small, short, somewhat square in transverse section; mouth with 4 very short, slightly upwardly curved and folded lips; with 4 narrow radial canals, extending from the circular canal to the peduncle and connected to the manubrium; gonads sinuous, along distal 1/2 to 1/3 of radial canals; 16–24 tentacles with elongated conical marginal bulbs and each with 2 pairs of lateral cirri; 3–5 rudimentary bulbs between tentacles, each



Figs 9–10. *Helcicirrha sinuatus*. Figs 11–12. *Clytia macrognoma* Bouillon, 1984. 9. Lateral view. 10. Enlargement of umbrella margin. Scale bars: 9–10 = 5.0 mm, 11 = 0.5 mm, 12 = 1.0 mm.

with one pair of lateral cirri, tentacular and rudimentary bulbs with adaxial excretory papillae; with 3–4 statocysts between tentacles, and each with 2–3 concretions; velum broad.

Remarks. The new species has a distinct gastric peduncle; with lateral cirri at the base of some or all marginal tentacle bulbs; with excretory papillae; numerous closed statocysts.

Only 11 valid species of *Helcicirrha* are known (Kramp, 1961, 1968; Xu & Huang, 1983; Bouillon, 1984; Bouillon *et al.*, 1988; Bouillon *et al.*, 2006; Huang *et al.*, 2010b). This new species is similar to *Helcicirrha danduensis* (Bigelow, 1904). It can be distinguished from it by: 1) gonads possessing sinuous shape; 2) 16–24 tentacles, each with 2 pairs of lateral cirri; 3) 3–5 rudimentary bulbs between tentacles, each with one pair of lateral cirri, 4) 3–4 statocysts between tentacles and each with 2–3 concretions (Key to species).

Distribution. Northern South China Sea (Beibu Gulf).

Key to *Helcicirrha*.

1. Gonads with medusa buds 2
- Gonads without medusa buds 3
2. Gonads in distal 1/3 of radial canals; with 16–21 marginal tentacles; all with 1 or 2 pairs of lateral cirri *H. medusifera* (Bigelow, 1909)
- Gonads in middle portion of radial canals; with 4 marginal tentacles, each tentacle with four pairs of lateral cirri *H. gemmifera* Bouillon, 1984
3. Gonads linear, extending from the base of peduncle to near bell margin 4
- Gonads short, along middle or distal of radial canals 9
4. With fewer than 25 tentacles 5
- With more than 25 tentacles 6
5. Gonads undulate-shaped, with 16–18 tentacles without lateral cirri, and 80 rudimentary bulbs with one pair of lateral cirri *H. irregularis* Bouillon, Boero & Seghers, 1988
- Gonads simple, with 14 tentacles and 56–84 rudimentary bulbs, all bulbs with lateral cirri *H. weaveri* Allwein, 1967
6. Peduncle short, never extending beyond the velar opening 7
- Peduncle long, extending beyond the velar opening 8
7. Oral lips longer than the length of the manubrium; 50–60 tentacles without lateral cirri; about 100 smaller tentacles, each with one pair of lateral cirri *H. cari* (Haeckel, 1864)
- Oral lips shorter than the length of the manubrium; 28–54 tentacles with two pairs of lateral cirri; without smaller tentacles *H. brevistyla* Xu & Huang, 1983
8. With 30–40 large tentacles, with elongated conical bulbs with or without lateral cirri; with 100 or more small tentacles or rudimentary bulbs, each with one pair of lateral cirri; tentacle bulbs without abaxial spur *H. schulzei* Hartlaub, 1909
- With 30–141 tentacles, with conical-like or elliptic-like bulbs with lateral cirri; with 1–3 rudimentary bulbs without lateral cirri; tentacular bulbs with abaxial spur *H. malayensis* (Stiasny, 1928)
9. Peduncle short, never extending beyond the velar opening 10
- Peduncle long, extending beyond the velar opening 11
10. Gonads oval-shaped in middle portion of radial canals; 8 tentacles with three pairs of lateral cirri; with 1–2 rudimentary bulbs between tentacles, each with one pair of lateral cirri and a black spot on its extreme tip *H. ovalis* Huang, Xu, Lin & Guo, 2010
- Gonads sausage-shaped, along distal half of radial canals or slightly



Figs 13–18. Microphotograph of medusae. 13. *Tregoubovia perradialis* sp. nov. 14. *Timoides agassizi* Bigelow, 1904. 15. *Euphysona vacuola* sp. nov. 16–17. *Helgicirra sinuatus* sp. nov. 18. *Clytia macroura* Bouillon, 1984. 13, 15–16, 18. Lateral view. 14. Oral view. 17. Umbrella margin. Scale bars: 13–14 = 2.0 mm; 15 = 0.5 mm; 16 = 5.0 mm; 18 = 1.0 mm.

near umbrella margin; 16–22 tentacles with 2–3 pairs of lateral cirri; with three rudimentary bulbs between tentacles, each with 1–3 pairs of lateral cirri and no black spot at extreme tip
H. cornelli Bouillon, 1984

11. Gonads spindle-shaped, along distal 2/3 of radial canals; with 32 tentacles, the perradial a little longer, each with 1 pair of lateral cirri; with 1–2 rudimentary bulbs between tentacles without lateral

cirri; with 1 statocyst and each with 5 concretions
H. danduensis (Bigelow, 1904)

Gonads sinuous-shaped, along distal 1/2 to 1/3 of radial canals; with 16–24 tentacles, each with 2 pairs of lateral cirri, with 3–5 rudimentary bulbs between tentacles, each with one pair of lateral cirri; with 3–4 statocysts between tentacles and each with 2–3 concretions
H. sinuatus Xu, Huang *et al.*, sp. nov.

Order Proboscidea Broch, 1910

Family Campanulariidae Johnston, 1836

Clytia macrogona Bouillon, 1984 (Figs 11–12, 18)
Clytia macrogona Bouillon, 1984: 32–33, Fig. 2; Bouillon *et al.*, 2004: 195, Fig. 109K.

Material examined. Beibu Gulf, BG 010 (1 spm.), st. S19 (18°30'N, 108°E; depth. 70 m), 6 Jan. 2007, coll. LIANG Xin (SFR).

Description. Umbrella 1.2–1.5 mm high, 1.5–2.5 mm wide, nearly hemispherical or discoidal; jelly thin, thicker mainly in the apical region, thinning gradually toward umbrella margin; manubrium small, cruciform with rounded perradial lobes; mouth with 4 simple lips; 4 radial canals and 1 narrow circular canal; gonads cylindrical, almost the entire length of radial canals, females with about 20 very large eggs; with 16–28 short marginal tentacles; marginal tentacular bulbs large, globular; 1 statocyst between successive tentacles.

Remarks. The morphology of *Clytia macrogona* superficially resembles medusae of *Clytia discoida* (Mayer, 1900) because both possess gonads visible along almost the whole length of the radial canals. However, *C. discoida* differs as follows: an urn-shaped manubrium, with bulging sides, mouth with 4 recurved lips; with 16 short marginal tentacles; usually 3 statocysts between tentacles (Kramp, 1961; Bouillon *et al.*, 2004). *C. macrogona* has a cruciform manubrium, with perradial lobes; a mouth with four simple lips; 24–36 short marginal tentacles; 1 statocyst between tentacles. This is a new record of this species in Chinese waters.

Distribution. Northern South China Sea, Indo-Pacific, Mediterranean.

Acknowledgements We thank LIANG Xin, SUN Dian-Rong, WANG Xue-Hui and WANG Yue-Zhong who assisted in field sampling.

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中国南海北部湾水母类调查及三新种记述（刺胞动物门）

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摘要 材料系于2007年(1, 4, 7, 10月)、2008年(1, 7月)和2009年(1月)在北部湾水域采集的, 调查海区共设52站, 共采集364份样品。经分析鉴定出67种水母, 其中有3新种和中国2新纪录, 主辐特古水母 *Tregoubovia perradialis* Xu, Huang et Du, sp. nov., 泡真囊水母 *Euphyllora vacuola* Xu, Huang et Guo, sp. nov., 波腺侧丝水母 *Helgicirrha sinuatus* Xu, Huang et Du, sp. nov., 艾格帝纹水母 *Timoidea agassizi* Bigelow, 1904 和大腺美螅水母 *Clytia macrogonia* Bouillon, 1984。此外, 还报道了20种水母为北部湾新纪录。模式标本保存在中国水产科学研究院南海水产研究所。

主旨特古水母, 新种 *Tregoubovia perradialis* Xu, Huang et Du, sp. nov.

鉴别特征 伞近钟形, 外伞有16条双层向心肋; 垂管很大, 近方形, 约为内伞腔深度4/5; 口有4个延长成触手状的口唇, 具环状刺胞, 无末端刺胞球; 隔膜短; 4个大的椭圆形生殖腺, 几乎覆盖整个垂管主辐位; 伞缘无缘触手或缘基球; 无眼点。

正模(BG 001), 北部湾S30站(17°30'N, 107°30'E; 水深70 m), 2008-07-06, 梁新采(南海水产研究所)。

词源: 新种种名源自拉丁词 *perradialis*, 意为生殖腺位于垂管主辐位。

泡真囊水母, 新种 *Euphyllora vacuola* Xu, Huang et Guo, sp. nov.

鉴别特征 伞有钝圆形顶突; 垂管长椭圆形, 约有1/2长度超出缘膜口外, 垂管基部很宽, 覆盖着浓密泡状细胞组

关键词 刺胞动物门, 水螅水母纲, 新种, 北部湾。

中图分类号 Q959.131

织; 4条辐管上部与扩大的垂管基部连接; 生殖腺围绕着垂管壁; 主触手很长, 触手基球很大, 呈卵圆形至球形, 触手上具30~40个成排的背轴刺胞球, 无末端膨大刺胞球, 另3个触手基球退化, 很小, 同样大小, 无丝状触手, 每个基球具外胚层背距。

正模(BG 006), 北部湾C15站(20°N, 109°E; 水深44 m), 2007-07-25, 梁新采(南海水产研究所)。副模(TB 001), 台湾海峡102站(23°40'N, 118°44'E; 水深54 m), 1988-06-29, 黄加祺采(厦门大学海洋学系)。

词源: 新种种名源自拉丁词 *vacuola*, 意为该种在垂管基部覆盖浓密泡状细胞组织。

波腺侧丝水母, 新种 *Helgicirrha sinuatus* Xu, Huang et Du, sp. nov.

鉴别特征 伞略扁于半球形; 胃柄长, 约有1/2超出缘膜口外, 垂管短小, 口有4个短的略为向上弯曲折叠的口唇; 生殖腺深波形, 位于辐管远端1/3处; 16~24条缘触手, 每条触手具2对侧丝, 每2条触手间有3~5个缘疣, 具1对侧丝和3~4个平衡囊, 每个平衡囊有2~4个平衡石; 所有触手和缘疣基部均有向轴排泄乳突。

正模(BG 007), 副模(BG 008~009), 北部湾S18站(18°45'N, 106°45'E; 水深53 m), 2007-04-15, 梁新采(南海水产研究所)。

词源: 新种种名源自拉丁词 *sinuatus*, 意为该种生殖腺深波状。

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